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species there is usually a further subdivision into such topics as land form, water form, submersed form, form with floating leaves, etc. The greater part of the work is taken up by the plants of the water margin ("zone 2"). These belong to two categories, so far as leaf form is concerned, those that are homoblastic or with but one leaf type, and those that are heteroblastic or with two leaf types; the heteroblastic water plants are with us well represented by such plants as *Sium* and *Proserpinaca*. Most of the plants of "zone 1" have greatly reduced water forms, many of which are generally unfamiliar, and some of which are known only from cultures; these forms rarely flower. One of the striking discoveries is a water form of a dodder (*Cuscuta alba*) which parasitizes *Isoetes* and water buttercups. Only a few of the species studied live in flowing water. The water forms seem related to low temperatures, and while the land form is essentially a summer form, it can sometimes be produced at other seasons by raising the temperature of the cultures. Most of the species have winter rest periods, but there are some species that vegetate continuously, even in countries with cold winters. Many Mediterranean species have periods of summer rest. These and many other topics are considered in the 40-page summary with which the volume concludes. The book should be in every botanical reference library, for it will serve as a compendium of general ecological information about the plants it treats. It is understood that Dr. GLÜCK is devoting his life to the study of water plants, and we may expect other volumes of this sort in the future.—HENRY C. COWLES.

Plant breeding in Sweden

The extensive series of experiments in plant breeding which have been conducted in Sweden, principally at the Svalöf station, beginning about 1886 and extending with ever increasing efficiency to the present time, are of great interest not only to agriculturists but also to scientists by reason of the problems of inheritance which they involve. Unfortunately very scanty reports of these operations have been available in any but the Swedish language, and these publications have been, and quite rightly so, most largely concerned with practical results that were of special interest to the farmers of Scandinavia. These circumstances will make the present report³ the more useful, prepared as it is by one who has carefully investigated the methods employed and the results obtained at the Swedish stations, and addressed primarily to the scientific reader, but in language intelligible to the general public.

The report contains a brief historical sketch of the inception and development of plant breeding experimentation in Scandinavia, examples of the experiments with different agricultural plants, some of the results obtained, and a summary of the principles now recognized by the plant breeders at Svalöf and followed in their work. These principles are briefly: (1) the recognition

³ NEWMAN, L. H., Plant breeding in Scandinavia. 8vo. pp. 193. figs. 63. Ottawa, Canada: Canadian Seed Growers' Association. 1912. \$1.00.

that a progressive system of plant improvement cannot be a one-sided system, but must embrace all possible methods of reaching the desired end; (2) artificial hybridization provides an invaluable means of obtaining characters in superior combinations which do not occur in nature and this method is now largely used at Svalöf for this purpose; (3) the old system of "mass selection" can still be of value in special cases and has never been fully abandoned; (4) instead of basing the isolation of superior individuals (or lines) purely upon botanical or morphological characters, as was formerly done, the principle has become to select a large number of individuals without special regard to such characters, the valuation of these individuals (or lines) to rest upon tests conducted with the greatest care and extending over a series of years. This means the recognition of the importance of physiological as well as morphological unit characters, and the abandonment of reliance upon the use of correlation of characters as any important aid in estimating the practical value of an individual or line.

Detailed reports of some investigations, some sixty illustrations from drawings and photographs, and a comprehensive bibliography add to the value of the volume. Dr. TEDIN, specialist for barley at Svalöf, says of the book: "The exposition is pertinent and correct and thereby distinguishes itself from practically all accounts hitherto written in a foreign language."—GEO. D. FULLER.

The cotton plant

W. LAWRENCE BALLS, "cryptogamic botanist" on the staff of the Khedivial Agricultural Society, has published a volume on the cotton plant in Egypt.⁴ It brings together information of the most varied character, the material being assembled as if to "take account of stock" preliminary to a fuller monograph. The four sections of the book treat of the history of cotton in Egypt, the individual plant, the race, and the economics of cotton, the second and third sections being of special interest to botanists.

In the account of "the individual plant" a brief outline of fertilization (including the conspicuous cytological features) and embryology is given (8 pp.), followed by an account of experimental work on "development and environment" (67 pp.). This physiological work includes such topics as germination conditions, temperature and growth, effect of sunshine, night temperatures, hypocotyl and root growth, transpiration (including its relation to stomata), tissue temperatures, photosynthesis, the growth curve, the flowering curve, etc. The cotton fiber of course is described in detail (8 pp.). In the account of "the race," the problems of fluctuation, commercial varieties, natural crossing, and heredity are presented (87 pp.), quite a number of graphs presenting to the eye the results of much experimental work.—J. M. C.

⁴ BALLS, W. LAWRENCE, *The cotton plant in Egypt; studies in physiology and genetics*. pp. xvi+202. *figs.* 71. London: Macmillan & Co. 1912. 5 s.